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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,074	07/19/2001	Joyce S.Oey Hewett	2000.075200/TT4629	9763
23720	7590	12/03/2003	EXAMINER	
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			NGUYEN, KHIEM D	
			ART UNIT	PAPER NUMBER
			2823	
DATE MAILED: 12/03/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/909,074

Applicant(s)

HEWETT ET AL.

Examiner

Khiem D Nguyen

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-13 and 15-41 is/are pending in the application.
- 4a) Of the above claim(s) 16-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-13 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

In view of the arguments presented in the Appeal Brief filed September 5, 2003, paper No. 11, prosecution on the merits is reopened to address the issues raised in the Brief. The grounds of rejections in the prior Office actions are withdrawn, and new grounds of rejection are presented here. 37 CFR 1.193 (b)(2) applies:

(2) Where prosecution is reopened by the primary examiner after an appeal or reply brief has been filed, appellant must exercise one of the following two options to avoid abandonment of the application:

(i) File a reply under § 1.111, if the Office action is not final, or a reply under § 1.113, if the Office action is final; or

(ii) Request reinstatement of the appeal. If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (§ § 1.130, 1.131 or 1.132) or other evidence are permitted.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (U.S. Pub. 2002/0032499) in view of Choi et al. (U.S. Patent 6, 322, 713) and Toyoda et al. (U.S. Patent 6,503,376).

In re claim 1, Wilson discloses a method of controlling a conductive layer deposition process comprising (See page3, paragraphs [0023]- [0025] and **FIGS. 1** and 4): depositing a conductive layer such as copper above a first semiconductor wafer based upon a deposition recipe (page 1, paragraphs [004] and [0008] and page 7, paragraph [0061]); measuring a thickness of the conductive (copper) layer deposited on the semiconductor wafer and determining whether the measured thickness of the conductive (copper) layer is within a predetermined tolerance 76 (page 5, paragraph [0042] and **FIG. 4**); and, revising the deposition recipe according to at least one predetermined model if the measured thickness of the conductive (copper) layer is not within the predetermined tolerance 78 (page 5, paragraph [0042] and **FIG. 4**);

Wilson does not explicitly disclose revising at least one parameter selected from the group consisting of a chemical concentration of an electroplating bath and an anode-cathode spacing of the deposition recipe if the measured thickness of the conductive layer is not within the predetermined tolerance.

Choi discloses that the thickness of a conductive layer may be controlled by the processing variables such as the time, temperature, chemical concentration, and current density (col. 4, lines 20-39) and Toyoda discloses wherein the thickness of a conductive layer may be affected by the anode-cathode spacing (col. 1, lines 59-64). In view of recognition that the chemical concentration of an electroplating bath and the anode-cathode spacing affect the thickness of the conductive layer. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Wilson, Choi and Toyoda to achieve or revising the deposition recipe in

Art Unit: 2823

Wilson by changing the chemical concentration and anode-cathode spacing and furthermore a good thickness distribution of the film can be obtain (col. 3, lines 10-11).

In re claims 2 and 5, Wilson discloses wherein depositing a conductive layer above the first semiconductor wafer further comprises deposition a copper layer above a first semiconductor wafer (page 1, paragraphs [004] and [0008] and page 7, paragraph [0061]); measuring the thickness of the conductive layer further comprises measuring the thickness of the copper layer; determining whether the measured thickness of the conductive layer is within a predetermined tolerance further comprises determining whether the measured thickness of the copper layer is within the predetermined tolerance (page 5, paragraph [0042] and FIG. 4); and, revising the deposition recipe according to at least one predetermined model further comprises revising the deposition recipe if the measured thickness of the copper layer is not within the predetermined tolerance (page 5, paragraph [0042] and FIG. 4);

In re claim 4, Wilson discloses using the newest parameter derived in step 80 (FIG. 4) in processing subsequent microelectronic workpieces (paragraph [0042]).

Therefore, Wilson inherently teaches depositing a conductive layer above a second semiconductor wafer based upon the revised deposition recipe.

3. Claims 6-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (U.S.P.A.P 2002/0032499) in view of Choi et al. (U.S. Patent 6, 322, 713) and Toyoda et al. (U.S. Patent 6,503,376).

In re claims 6-8, Wilson discloses a method of controlling a conductive layer deposition process comprising (page3, paragraph [0025] and **FIGS. 1 and 4**): depositing

Art Unit: 2823

a conductive layer such as copper above a first semiconductor wafer based upon a deposition recipe (page 1, paragraph [004] and [0008] and page 7, paragraph [0061]); measuring a thickness of the conductive (copper) layer at a plurality of predetermined pattern of locations (page 7, paragraph [0061] and Table 1); calculating a value representing the measured thickness measured at the plurality of locations (page 9, paragraph [0088]); determining whether the calculated value is within a predetermined tolerance (page 5, paragraph [0042] and **FIG. 4**); and, revising the deposition recipe based upon at least the calculated value if the calculated value is not within the predetermined 78 (page 5, paragraph [0042] and **FIG. 4**);

**Wilson** does not explicitly disclose revising at least one parameter selected from the group consisting of a chemical concentration of an electroplating bath and an anode-cathode spacing of the deposition recipe if the measured thickness of the conductive layer is not within the predetermined tolerance.

**Choi** discloses that the thickness of a conductive layer may be controlled by the processing variables such as the time, temperature, chemical concentration, and current density (col. 4, lines 20-39) and **Toyoda** discloses the thickness of a conductive layer may be affected by the anode-cathode spacing (col. 1, lines 59-64). In view of recognition that the chemical concentration of an electroplating bath and the anode-cathode spacing affect the thickness of the conductive layer. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Wilson, Choi and Toyoda to achieve or revising the deposition recipe in

Art Unit: 2823

Wilson by changing the chemical concentration and anode-cathode spacing and furthermore a good thickness distribution of the film can be obtained (col. 3, lines 10-11).

In re claims 9 and 10, Wilson discloses calculating a value representing the measured thickness comprises calculating an average (arithmetic mean) of the plurality of thickness measurements (page 9, paragraph [0088]).

In re claims 11 and 12, Wilson discloses wherein determining whether the calculated value is within a predetermined tolerance 76 comprises calculating a measure of a degree of dispersion of the plurality of thickness measurements about the calculated value and comparing the measure of the degree of dispersion to a predetermined statistical distribution selected from the group consisting of the standard deviation (normal distribution) (page 9, paragraphs [0088] and [0091] and page 5, paragraph [0042] and FIG. 4).

In re claim 13, Wilson discloses wherein revising the deposition recipe further comprises revising the deposition recipe according to at least one predetermined model (page 5, paragraphs [0042]-[0043]).

In re claim 15, Wilson discloses using the newest parameter derived in step 80 (FIG. 4) in processing subsequent microelectronic workpieces (paragraph [0042]). Therefore, Wilson inherently teaches depositing a conductive layer above a second semiconductor wafer based upon the revised deposition recipe.

Art Unit: 2823

***Conclusion***

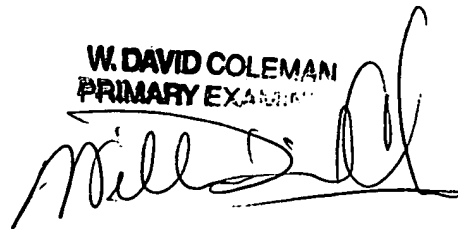
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
November 30, 2003

W. DAVID COLEMAN  
PRIMARY EXAMINER

A handwritten signature in black ink, appearing to read "W. David Coleman", is written over the printed name and title.